1. Subsartorial canal is an important area in the lower limb

The adductor canal (Hunter’s canal, subsartorial canal) is a narrow conical tunnel located in the thigh.

It is approximately 15cm long, extending from the apex of the [femoral triangle](https://teachmeanatomy.info/lower-limb/areas/the-femoral-triangle/) to the adductor hiatus of the adductor magnus. The canal serves as a passageway from structures moving between the anterior thigh and posterior leg.

**Borders**

The adductor canal is bordered by muscular structures:

• Anteromedial: Sartorius.

• Lateral: Vastus medialis.

• Posterior: Adductor longus and adductor magnus.

The adductor canal runs from the apex of the femoral triangle to the adductor hiatus – a gap between the adductor and hamstring attachments of the adductor magnus muscle.

**Contents**

The adductor canal serves as a passageway for structures moving between the anterior thigh and posterior leg.

It transmits thefemoral artery, femoral vein (posterior to the artery), nerve to the vastus medialis and the saphenous nerve – the largest cutaneous branch of the femoral nerve.

As the femoral artery and vein exit the canal, they are called the poplitealartery and vein respectively.

Clinical Relevance - Adductor Canal Block

In the adductor canal block, local anaesthetic is administered in the adductor canal to block the saphenous nerve in isolation, or together with the nerve to the vastus medialis.

The block can be used to provide sensory anaesthesia for procedures involving the distal thigh and femur, knee and lower leg on the medial side. The sartorius and femoral artery are used as anatomical landmarks to locate the saphenous nerve.

Clinical Relevance - Adductor Canal Compression Syndrome

Adductor canal compression syndrome describes entrapment of the neurovascular bundle within the adductor canal. A rare condition, it is usually caused by hypertrophy of the saphenous nerve.

1. Subsartorial canal is an important area in the lower limb discuss.

Origin

Since only a small part of the eye called the [fovea](https://en.wikipedia.org/wiki/Fovea_centralis) provides sharp vision, the eye must move to follow a target. Eye movements must be precise and fast. This is seen in scenarios like reading, where the reader must shift gaze constantly. Although under voluntary control, most eye movement is accomplished without conscious effort. Precisely how the integration between voluntary and involuntary control of the eye occurs is a subject of continuing research. It is known, however, that the [vestibulo-ocular reflex](https://en.wikipedia.org/wiki/Vestibulo-ocular_reflex) plays an important role in the involuntary movement of the eye.

### Origins and insertions

Four of the extraocular muscles have their origin in the back of the orbit in a fibrous ring called the [annulus of Zinn](https://en.wikipedia.org/wiki/Annulus_of_Zinn): the four rectus muscles. The four rectus muscles attach directly to the front half of the eye (anterior to the eye's equator), and are named after their straight paths. Note that medial and lateral are relative terms. Medial indicates near the midline, and lateral describes a position away from the midline. Thus, the medial rectus is the muscle closest to the nose. The superior and inferior recti do not pull straight back on the eye, because both muscles also pull slightly medially. This posterior medial angle causes the eye to roll with contraction of either the superior rectus or inferior rectus muscles. The extent of rolling in the recti is less than the oblique, and opposite from it.

The *superior oblique* muscle originates at the back of the orbit (a little closer to the medial rectus, though medial to it), getting rounder as it courses forward to a rigid, cartilaginous pulley, called the [trochlea](https://en.wikipedia.org/wiki/Trochlea_of_superior_oblique), on the upper, nasal wall of the orbit. The muscle becomes tendinous about 10mm before it passes through the pulley, turning sharply across the orbit, and inserts on the lateral, posterior part of the globe. Thus, the superior oblique travels posteriorly for the last part of its path, going over the top of the eye. Due to its unique path, the superior oblique, when activated, pulls the eye downward and laterally.

The last muscle is the *inferior oblique*, which originates at the lower front of the nasal orbital wall, and passes under the LR to insert on the lateral, posterior part of the globe. Thus, the inferior oblique pulls the eye upward and laterally.

The movements of the extraocular muscles take place under the influence of a system of [extraocular muscle pulleys](https://en.wikipedia.org/w/index.php?title=Extraocular_muscle_pulleys&action=edit&redlink=1), soft tissue [pulleys](https://en.wikipedia.org/wiki/Pulley) in the orbit. The extraocular muscle pulley system is fundamental to the movement of the eye muscles, in particular also to ensure conformity to [Listing's law](https://en.wikipedia.org/wiki/Listing%27s_law). Certain diseases of the pulleys (heterotopy, instability, and hindrance of the pulleys) cause particular patterns of incomitant [strabismus](https://en.wikipedia.org/wiki/Strabismus). Defective pulley functions can be improved by surgical interventions.

### Blood supply

The extraocular muscles are supplied mainly by branches of the [ophthalmic artery](https://en.wikipedia.org/wiki/Ophthalmic_artery). This is done either directly or indirectly, as in the lateral rectus muscle, via the [lacrimal artery](https://en.wikipedia.org/wiki/Lacrimal_artery), a main branch of the ophthalmic artery. Additional branches of the ophthalmic artery include the [ciliary arteries](https://en.wikipedia.org/wiki/Ciliary_arteries), which branch into the [anterior ciliary arteries](https://en.wikipedia.org/wiki/Anterior_ciliary_arteries). Each rectus muscle receives blood from two anterior ciliary arteries, except for the lateral rectus muscle, which receives blood from only one. The exact number and arrangement of these cilary arteries may vary. Branches of the [infraorbital artery](https://en.wikipedia.org/wiki/Infraorbital_artery) supply the inferior rectus and inferior oblique muscles.

### Nerve supply

|  |  |
| --- | --- |
| **Cranial nerve** | **Muscle** |
| Oculomotor nerve  (N. III) | Superior rectus muscle  Inferior rectus muscle  Medial rectus muscle  Inferior oblique muscle |
| Levator palpebrae superioris muscle |
| Trochlear nerve  (N. IV) | Superior oblique muscle |
| Abducens nerve  (N. VI) | Lateral rectus muscle |

The nuclei or bodies of these nerves are found in the brain stem. The nuclei of the abducens and oculomotor nerves are connected. This is important in coordinating the motion of the lateral rectus in one eye and the medial action on the other. In one eye, in two antagonistic muscles, like the lateral and medial recti, contraction of one leads to inhibition of the other. Muscles show small degrees of activity even when resting, keeping the muscles taut. This "[tonic](https://en.wikipedia.org/wiki/Muscle_tone)" activity is brought on by discharges of the motor nerve to the muscle.

### Development

The extraocular muscles develop along with [Tenon's capsule](https://en.wikipedia.org/wiki/Tenon%27s_capsule) (part of the ligaments) and the fatty tissue of the [eye socket (orbit)](https://en.wikipedia.org/wiki/Orbit_(eye)). There are three centers of growth that are important in the development of the eye, and each is associated with a nerve. Hence the subsequent nerve supply (innervation) of the eye muscles is from three [cranial nerves](https://en.wikipedia.org/wiki/Cranial_nerves). The development of the extraocular muscles is dependent on the normal development of the eye socket, while the formation of the ligament is fully independent.

## Function

### Movements

*Main article:* [*Eye movement*](https://en.wikipedia.org/wiki/Eye_movement)

Schematic demonstrating the actions and cranial nerve innervation (in subscript) of extraocular muscles.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Muscle** | [**Innervation**](https://en.wikipedia.org/wiki/Innervation) | **Origin** | **Insertion** | **Primary action** | **Secondary action** | **Tertiary action** |
| [Medial rectus](https://en.wikipedia.org/wiki/Medial_rectus_muscle) | [Oculomotor nerve  (inferior branch)](https://en.wikipedia.org/wiki/Inferior_branch_of_oculomotor_nerve) | [Annulus of Zinn](https://en.wikipedia.org/wiki/Annulus_of_Zinn) | [Eye](https://en.wikipedia.org/wiki/Human_eye)  (anterior, medial surface) | [Adduction](https://en.wikipedia.org/wiki/Adduction) |  |  |
| [Lateral rectus](https://en.wikipedia.org/wiki/Lateral_rectus_muscle) | [Abducens nerve](https://en.wikipedia.org/wiki/Abducens_nerve) | [Annulus of Zinn](https://en.wikipedia.org/wiki/Annulus_of_Zinn) | [Eye](https://en.wikipedia.org/wiki/Human_eye)  (anterior, lateral surface) | [Abduction](https://en.wikipedia.org/wiki/Abduction_(anatomy)) |  |  |
| [Superior rectus](https://en.wikipedia.org/wiki/Superior_rectus_muscle) | [Oculomotor nerve  (superior branch)](https://en.wikipedia.org/wiki/Superior_branch_of_oculomotor_nerve) | [Annulus of Zinn](https://en.wikipedia.org/wiki/Annulus_of_Zinn) | [Eye](https://en.wikipedia.org/wiki/Human_eye)  (anterior, superior surface) | [Elevation](https://en.wikipedia.org/wiki/Elevation) | [Incyclotorsion](https://en.wikipedia.org/wiki/Incyclotorsion) | [Adduction](https://en.wikipedia.org/wiki/Adduction) |
| [Inferior rectus](https://en.wikipedia.org/wiki/Inferior_rectus_muscle) | [Oculomotor nerve  (inferior branch)](https://en.wikipedia.org/wiki/Inferior_branch_of_oculomotor_nerve) | [Annulus of Zinn](https://en.wikipedia.org/wiki/Annulus_of_Zinn) | [Eye](https://en.wikipedia.org/wiki/Human_eye)  (anterior, inferior surface) | [Depression](https://en.wikipedia.org/wiki/Depression_(kinesiology)) | [Excyclotorsion](https://en.wikipedia.org/wiki/Excyclotorsion) | [Adduction](https://en.wikipedia.org/wiki/Adduction) |
| [Superior oblique](https://en.wikipedia.org/wiki/Superior_oblique_muscle) | [Trochlear nerve](https://en.wikipedia.org/wiki/Trochlear_nerve) | [Sphenoid bone](https://en.wikipedia.org/wiki/Sphenoid_bone)  via the [Trochlea](https://en.wikipedia.org/wiki/Trochlea_of_superior_oblique) | [Eye](https://en.wikipedia.org/wiki/Human_eye)  (posterior, superior, lateral surface) | [Incyclotorsion](https://en.wikipedia.org/wiki/Incyclotorsion) | [Depression](https://en.wikipedia.org/wiki/Depression_(kinesiology)) | [Abduction](https://en.wikipedia.org/wiki/Abduction_(anatomy)) |
| [Inferior oblique](https://en.wikipedia.org/wiki/Inferior_oblique_muscle) | [Oculomotor nerve  (inferior branch)](https://en.wikipedia.org/wiki/Inferior_branch_of_oculomotor_nerve) | [Maxillary bone](https://en.wikipedia.org/wiki/Maxillary_bone) | [Eye](https://en.wikipedia.org/wiki/Human_eye)  (posterior, inferior, lateral surface) | [Excyclotorsion](https://en.wikipedia.org/wiki/Excyclotorsion) | [Elevation](https://en.wikipedia.org/wiki/Elevation) | [Abduction](https://en.wikipedia.org/wiki/Abduction_(anatomy)) |
| [Levator palpebrae superioris](https://en.wikipedia.org/wiki/Levator_palpebrae_superioris) | [Oculomotor nerve](https://en.wikipedia.org/wiki/Oculomotor_nerve) | [Sphenoid bone](https://en.wikipedia.org/wiki/Sphenoid_bone) | [Tarsal plate](https://en.wikipedia.org/wiki/Tarsal_plate) of upper [eyelid](https://en.wikipedia.org/wiki/Eyelid) | [Elevation](https://en.wikipedia.org/wiki/Elevation)/[retraction](https://en.wikipedia.org/wiki/Retraction)  of the [upper eyelid](https://en.wikipedia.org/wiki/Upper_eyelid) |  |  |

### Movement coordination

Intermediate directions are controlled by simultaneous actions of multiple muscles. When one shifts the gaze horizontally, one eye will move laterally (toward the side) and the other will move medially (toward the midline). This may be neurally coordinated by the central nervous system, to make the eyes move together and almost involuntarily. This is a key factor in the study of strabismus, namely, the inability of the eyes to be directed to one point.

There are two main kinds of movement: conjugate movement (the eyes move in the same direction) and disjunctive (opposite directions). The former is typical when shifting gaze right or left, the latter is convergence of the two eyes on a near object. Disjunction can be performed voluntarily, but is usually triggered by the nearness of the target object. A "see-saw" movement, namely, one eye looking up and the other down, is possible, but not voluntarily; this effect is brought on by putting a prism in front of one eye, so the relevant image is apparently displaced. To avoid double vision from non-corresponding points, the eye with the prism must move up or down, following the image passing through the prism. Likewise conjugate torsion (rolling) on the anteroposterior axis (from the front to the back) can occur naturally, such as when one tips one's head to one shoulder; the torsion, in the opposite direction, keeps the image vertical.

1. Describe the importance of vasculature in relation to immune system and outbreak of pandemic covid-19 on the human body.

Vasculature is the arrangement of blood vessel in an organ or part of the body.

Immune system is the defense against infections and other harmful things in the body. It is the body personal army working from the cellular to macro level, each cell, molecule, tissue and organ in this army plays a vital role in warding off invading pathogens, and also help guard against internal threats like cancer.

* Until a vaccine is available, our immune system will need to adapt unaided to covid-19.
* The immune system is the body multi-level defense network against potentially harmful bacteria, viruses and other organisms.
* A healthy lifestyle helps ones immune system to be in the best shape possible to tackle pathogens, but its better to stop them entering the body in the first place.

The corona virus pandemic has turned the world attention to the immune system, the body defense force against disease causing bacteria, viruses and other organisms that we touch, ingest and inhale every day.